BULLETIN 605

Timely Field Operations for Corn and Soybeans in Ohio

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COOPERATIVE EXTENSION SERVICE • THE OHIO STATE UNIVERSITY

Timely Field Operations

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As farmers strive to increase production of corn and soybeans by maximizing yield or by increasing crop acres, they often find complex management problems. They find there are not enough hours in the day, or days in the week, to accomplish the needed work at the opportune time. As a result, farming operations that require careful timing are often done late or missed entirely, work peaks develop, the quality of work diminishes, yields are reduced and profit goals are not attained.

This bulletin is to help farmers plan ahead with their corn and soybean production programs so they can avoid many of the pitfalls described above. This plan includes taking into account production factors such as soil drainage, tillage practices, machine capacity, days available, variety selection, harvesting methods, grain moisture, harvest losses, drying capacity and actual yield.

Contents

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for Corn and Soybeans in Ohio

Days Available for Tillage and Planting

Time available for field work is limited by soil drainage, weather, and management controlled factors. This is particularly important in the spring, because late planting usually reduces yields. For corn the reduction in yield is about two bushels per acre per day after the optimum planting period and for soybeans the reduction in yields is about one-third bushel per acre per day after the optimum planting date.

Time is important in the fall, too. Timely harvest pays, because average corn harvesting losses increase one-fourth bushel per acre per day delay after corn reaches 26 percent moisture. You lose about five bushels per acre when you harvest 20 days after the corn reaches 26 percent moisture.

Soybean harvest losses also increase when harvest is delayed. For combines with a rigid cutterbar, the losses will increase about 1 bushel per acre per week delay. Combines equipped with a flexible floating cutterbar will experience a loss increase of about ⅓ bushel per acre per week delay.

We can't predict the weather far ahead, but we can estimate the days available based on past weather records. In order to find the probable time available for spring field work you need to know your soil and the risk you are willing to take.

For example: a poorly drained soil will be dry enough for land preparation and early planting from March 21 to May 1 at least 9 days during an average year. Or, we can say that 50 percent of the years there will be 9 or more days available for field work from March 21 to May 1 on poorly drained soils.

Few farmers can afford to plan for average weather, because that will mean being late half of the time. A better target would be to plan to be on time even if poor weather occurs.

A suggested goal is to be on time 80 percent of the years. If you are on time 80 percent of the years, that would mean completing field work when you want to 4 out of 5 years, 8 out of 10 years or 16 out of 20 years. It also means that you will be late 20 percent of the years, one out of five.

At this risk level you can expect 4 days to do field work between March 21 and May 1 on poorly drained soils and 10 days on well drained soils. On other soils, you'll have between 4 and 10 days in 80 percent of the years.

Table 1. Comparison of percent of year to number of years

Percent of Years	Number of Years
20%	1 out of 5, 2 out of 10, 4 out of 20
50% (average year)	5 out of 10, 10 out of 20
80%	4 out of 5, 8 out of 10, 16 out of 20

Agronomists have found that early planting means higher yields for both corn and soybeans. Since there is a physical and economic limit on how early work can be done, the goal is to get the best combination of labor, machinery, management practices and drainage improvements for crop production.

Drainage improvements can be used to increase the time available for field work and increase yields on poorly drained soils. This is important, because more than 1/3 of the cropland in Ohio is on soils with inadequate drainage.

Numerous Ohio fields have wet spots which keep them in the "inadequate drainage" category.

The effect of poor drainage on time available for field work is illustrated for March 21 to May 1 in Table 2. It shows that you can expect 9 days in a poorly drained field during this period if there is average weather, but only 4 or more days 80 percent of the years, 4 out of 5.

Table 2. Days available for field work March 21 to May 1 on poorly drained soils (7 day week).

Soil Drainage	Average Year	80 Percent of the Years
poor	9 days	4 or more days
poor, with drainage improvements	12 days	7 or more days

If recommended drainage improvements are installed, the days available increases by three. Or you can expect 7 or more days in the field from March 21 to May 1 in 80 percent of the years, 4 out of 5, on poorly drained soils with improved drainage.

Improved drainage may involve surface improvements such as field ditches and land smoothing or grading and subsurface drains of tile, concrete, or plastic tubing.

The time available on moderately well drained soils will be about the same as that for poorly drained soils with drainage improvements.

The time available March 21 to May 1 on well drained soils will be about 14 days for an average year and 10 or more days 80 percent of the years.

The better the soil drainage, the more time that will be available for spring field work. Evaluate your situation to develop realistic estimates of your spring field work schedule.

Table 3. Days available to plow, till or plant in Ohio, March 21-June 30, 80 percent of the years, 4 out of 5 (7 day week).

Soil	March 21-30	April 1-30	May 1-31	June 1-30
	DAYS			
Poorly drained	0 or more	4 or more	8 or more	9 or more
Poorly drained with drainage improvements	1 or more	6 or more	11 or more	11 or more
Well drained	2 or more	8 or more	13 or more	13 or more

Table 3 gives the estimated days available for field work between March 21 and June 30 for three soil drainage conditions 80 percent of the years.

Assistance in planning drainage improvements may be obtained from your county Soil and Water Conservation District, the local U. S. Soil Conservation Service office, or a land improvement contractor.

Equipment Selection

Equipment selection should be based upon the acres requiring each field operation, the number of days available for timely field operation, and the equipment capacity.

Tillage and planting equipment capacity is commonly expressed in acres per hour. It is determined by the effective working width of the machine, the actual speed of travel, and the efficiency of the field operation. The efficiency is expressed as the percentage of the total time the machine is in the field that it is actually operating. It is obtained by dividing the actual operating time in the field by the total time in the field.

The following formula is used in determining machine capacity:

> The width of the machine in ft. x the travel speed in miles per hour x the field efficiency factor ÷ by 8.25 (a constant).

For example: a 15 ft. disc traveling 5 miles per hour with an efficiency factor of 80 percent has a capacity of 7.27 acres per hour.

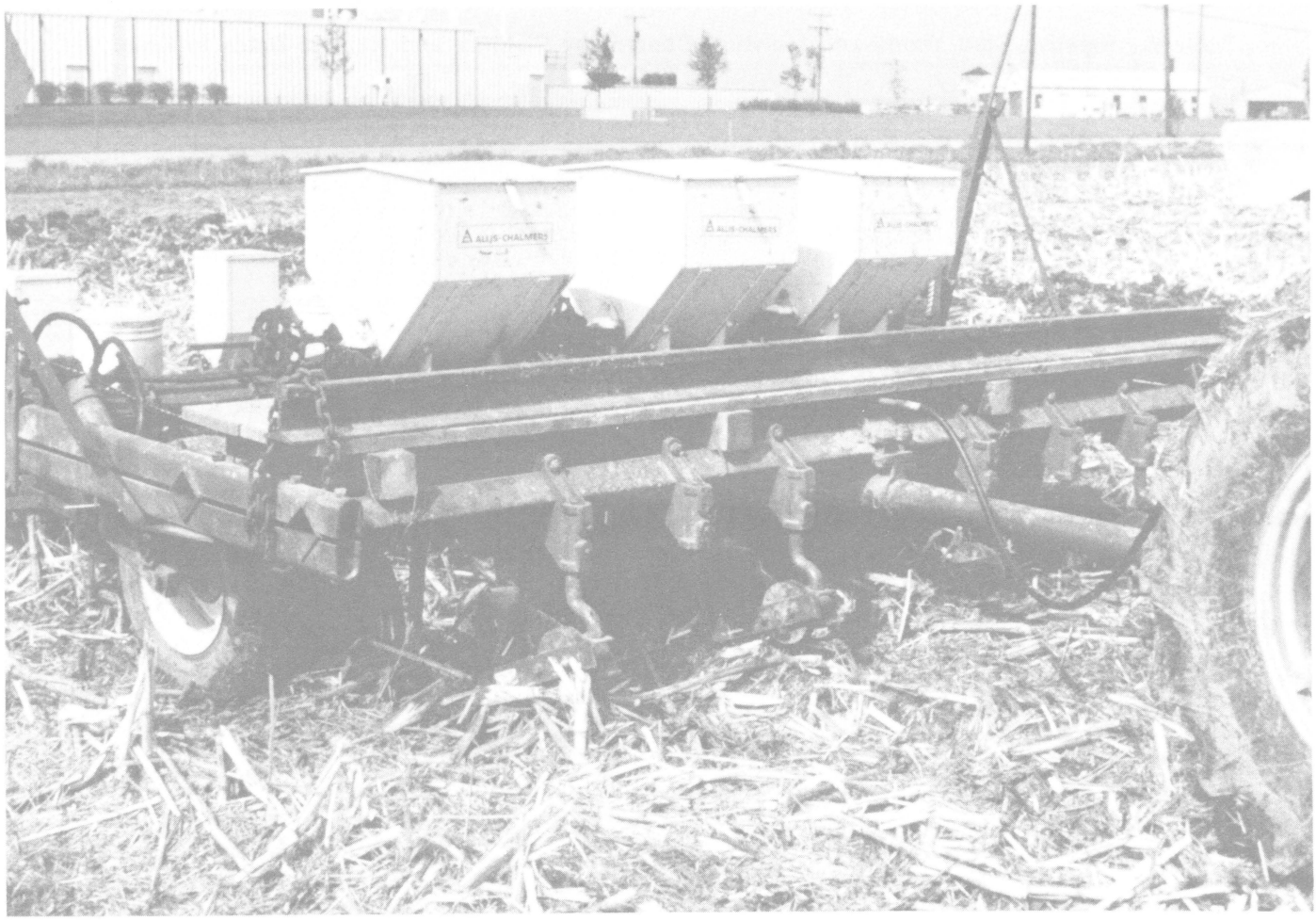
$$\frac{15 \times 5 \times .80}{8.25} = 7.27$$

Using a common speed of 5 m.p.h. and an 80% field efficiency factor, the following table gives the capacity in acres per hour for various tillage equipment.

Table 4. Average acres per hour for tillage equipment @ 5 m.p.h. and 80% efficiency.

Operation & Equipment Size	Acres per Hour
Plow –	
3 – 16 inch	1.9
4 – 16 "	2.6
5 – 16 "	3.2
6 – 16 "	3.9
7 – 16 "	4.5
8 – 16 "	5.2
Chisel Plow	
10'	4.8
13'	6 3
Disc	
14'	6.8
19'	9.2
24'	11.6
32'	15.5
Field Cultivator	
15'	7.3
22'	10.6
32'	15.5
37'	17.9

Table 5 gives the capacity of planting equipment when using a common speed of 4 m.p.h. and a field efficiency factor of 65%. Usually the field efficiency factor decreases as the size of equipment increases.



No-tillage corn planting has helped reduce time in the field for many growers.

Table 5. Average acres per hour for planting equipment @ 4 m.p.h. and 65% field efficiency.

Planter Size	Ac/hr.
10′ – 4 Row 30″ or 6 Row 20″	3.1
15′ – 6 Row 30″	4.7
20′ – 8 Row 30″ or 12 Row 20″	6.3
30′ – 12 Row 30″	9.5
40′ – 16 Row 30″ or 12 Row 40″	12.6

Once you know the capacity of the equipment in acres per hour you will need to determine the hours required to complete the job. If it cannot be done during the available calendar days when it should be, then you may consider the following alternatives.

1. Working more hours per day
2. Hiring additional labor to operate machine
3. Custom hiring of some or all of the operation
4. Buying larger machine
5. Use wider selection of varieties
6. Working less land
7. Improving drainage and increasing the number of days available
8. Increasing field efficiency

Variety Selection — Corn

Corn hybrids are selected for a given field to achieve a particular yield and grain moisture content by a given date. Also, you need high plant emergence and low percent lodging. In addition, the time required for the hybrid selected must fit into the work schedule for other crops.

To determine the likely performance of various corn hybrids refer to the most recent "Ohio Corn Performance Test" bulletin prepared by the Agronomy Department, OSU-OARDC, available from county Extension offices.

For example: the 1974 report shows that Landmark C722X planted May 21 at Bowling Green had 94% emergence, 1.5% lodging and harvested yield was 139.6 bu/ac at 24.4% moisture on October 24.

In general, highest corn yields are obtained from the best full season hybrids, planted early and harvested during the initial dry-down to between 26 and 22 percent moisture. However, many short season hybrids will yield as well or better than some full season ones. Make your selection according to hybrid and season length, not season length alone.

Table 6. Relative Corn Yields and Moisture Content by Planting and Harvest Dates in Ohio.

Planting Period	Harvest Period				
	Sept. 15-30	Oct. 1-15	Oct. 16-31	Nov. 1-15	Nov. 16-30
	A* B*	A B	A B	A B	A B
April 25-May 5	97% @ 30%	99% @ 28%	100% @ 26%	95% @ 23%	88% @ 21%
May 6-13	93% @ 35%	95% @ 30%	96% @ 28%	92% @ 25%	85% @ 23%
May 14-21	Not Mature	90% @ 35%	90% @ 30%	87% @ 27%	80% @ 25%
May 22-29	Not Mature	Not Mature	82% @ 33%	80% @ 30%	72% @ 27%
May 30-June 6	Not Mature	Not Mature	70%@ 35%	68% @ 32%	60% @ 29%

* Column A = relative yield in percent at 15½% moisture and column B = percent moisture at harvest. Actual moisture may be plus or minus 5% for moisture levels above 25%.

The relative corn yields and moisture content by planting and harvest dates are estimated in Table 6. Note that relative yields are in percent and that full, mid and short season hybrids can all give 100% yield. The actual bushels per acre will depend on the hybrid selected and the growing conditions.

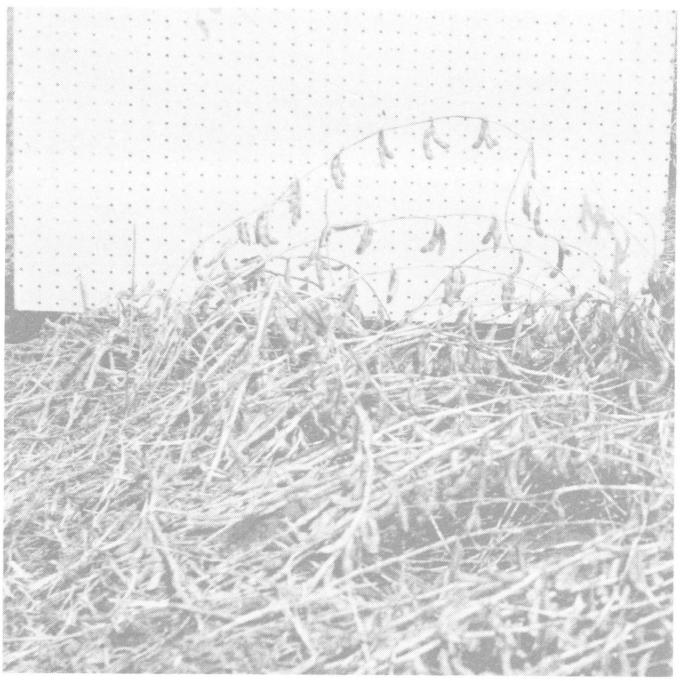
Table 6 shows that (1) delayed planting reduces yield, (2) corn harvested too early is not mature or has excessive moisture and (3) late harvest has reduced yields because of lodging and harvesting losses.

Variety Selection — Soybeans

Soybean varieties are usually selected for a specific field to achieve a specified yield goal. Consideration also should be given to varietal differences as to maturity length, pod shattering, stalk lodging, branching characteristics, and resistance to diseases. It is also important that the variety selected fit into the work schedule as dictated by the entire cropping program for the farm. It is now possible to determine the likely performance characteristics of various soybean varieties common to Ohio. This information is published each year by the Agronomy Department, OSU-OARDC, in a bulletin entitled "Ohio Soybean Performance Trials." For the more common varieties, performance data is available for more than one year.

For example, the 1974 Soybean Performance Trials show that the Williams variety yielded 56 bushels per acre when planted May 6 at the OARDC Western Branch. The plants averaged 40" in height and were all standing erect at the harvest date of October 10. By referring to Table 5 of this publication it can be noted that the Williams variety is susceptible to Phytophthora Root Rot and that there were no dead plants after flowering.

Planting date is an important factor in obtaining maximum soybean yields just as it is for corn. Ohio research indicates that a yield reduction of 2 to 3 bushels per acre can be expected with each week of planting delay after May 5.



Lodging reduces harvested yields in both corn and soybeans.

Timely harvest is also essential to reduce field losses. In general, the yield will be the greatest, and bean quality the highest, when harvesting is completed after the initial bean drydown reaches 17 or 18% moisture.

Delays in harvesting will generally result in increased field losses due to pod shattering, stalk lodging and possible bird and rodent action. Quality also deteriorates due to repeated wetting and drying and the chances increase for diseases (such as Phomopsis) to infect the beans.

The overall goal, then, of a good manager is to select varieties that will yield well and stand well such that they can be harvested at the opportune time. And, this harvest must be a date which does not interfere with other harvesting dates—such as for corn as an example. Thus, the farmers management goal is to select soybean varieties that will mature and be ready for harvest at a time when the corn crop is not yet ready to harvest (or vice versa). Or to come up with a harvesting program that allows both crops to be harvested at the opportune time.

The relative soybean yields as influenced by planting date and harvest date are shown in Table 7. This also suggests that your time schedule for both spring and fall operations must be considered to select the soybean variety that will give the greatest yield in the bin with the least risk and a minimum of management frustrations.

Table 7a. Average full season soybean yield by planting and harvest date in Ohio*

Planting Period	Harvest Period			
	Sept. 15-30	Oct. 1-15	Oct. 16-31	Nov. 1-15
May 1-15	Not Mature	100%	93%	79%
May 16-31	Not Mature	90	83	69
June 1-15	Not Mature	76	69	55
June 16-30	Not Mature	Not Mature	52	45

* Based on mautrity days greater than 130, less than 20% lodging and 0.3 percent harvest loss per day.

Table 7b. Average short season soybean yield by planting and harvest date*

Planting Period	Harvest Period			
	Sept. 15-30	Oct. 1-15	Oct. 16-31	Nov. 1-15
May 1-15	96%	89%	75%	61%
May 16-31	82	75	61	47
June 1-15	72	65	51	37
June 16-30	58	51	37	23

* Based on maturity days less than 130, less than 20% lodging and and 0.3 percent harvest loss per day.

Scheduling Conflicts

Scheduling conflicts occur when there are more things to do than there is time available to do them. The result is that something is delayed or omitted. Our concern is that important (most profitable) work be done first and other work delayed. So we have to consider the relative advantage of tillage, planting corn or planting soybeans on a particular day. Or, what is the trade-off between harvesting corn or harvesting soybeans.

Planting

Long-term corn studies have shown that May 7 is the planting date that gives highest average yields at Wooster, Ohio. The date is one day earlier for each 14 miles south, on the average, so the ideal planting date for corn at Portsmouth, Ohio is April 23. These same studies showed earlier or later planting to give lower yields. However, recent studies have given higher yields with earlier planting. Yield response of corn to planting date at Columbus, Ohio, is shown in Figure 1.

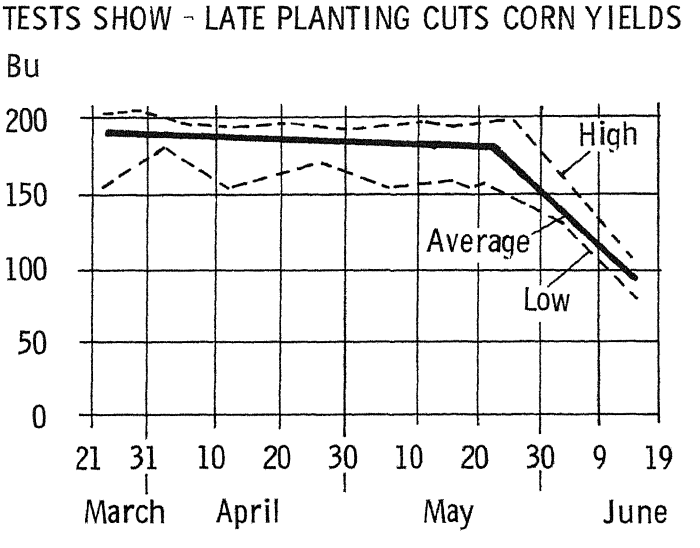


Figure 1. Corn yield response to planting date.

Soybeans have higher yields when planted early, too. Figure 2 gives soybean yield response to various planting date. If it took only one day to plant and one day to harvest, there would be no problem. You could just work the first day field conditions were suitable after the date of highest average yields and do your planting. But such isn't the case on most farms.

Tillage and planting may require 5 to 30 field days and harvest may require as much time. In addition, the harvest time conflicts are set by planting date and variety selection. Remember that it may take 30 calendar days to find 5 or 10 field days if you have bad weather.

Harvest

An easy trap to fall into is that of looking at only planting date yield response curves and planting a full season corn hybrid as early as possible followed by full season soybeans. The usual result is that both corn and soybeans are ready to harvest in October. As a result, harvesting is delayed for part of the crop and harvesting losses climb. It would be better to pick varieties that would be ready for harvest in sequence.

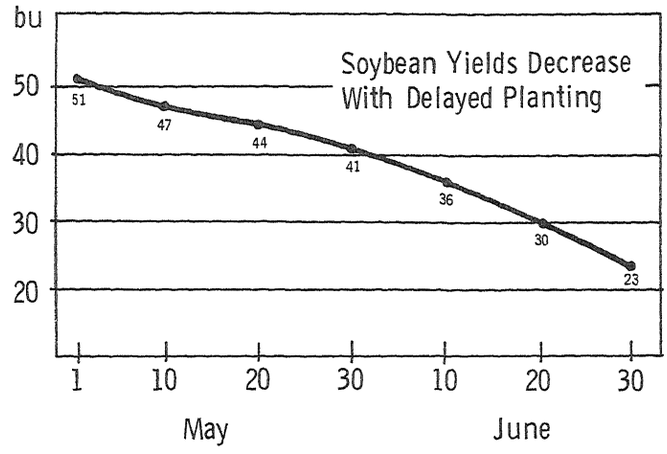


Figure 2. Soybean yield response to planting date.

If wheat is grown, the sowing of wheat competes for time during the harvest season. Include it in your schedule beginning after the "fly-safe" date.

Harvesting and Drying

Days are available for harvesting beginning after the crop matures and sufficient drying has occurred to allow harvest. (17 to 18% moisture for soybeans and 22 to 26% moisture for corn). After that, the limit is precipitation that makes the crop too wet to harvest or the soil too wet for equipment traffic.

Long term weather data shows there is about a 20 percent chance of at least 0.1 inches of rain on any given day between September 15 and November 30. If you consider a longer period, say a week, the probability of at least 0.1 inch of rain increases to about 75 percent. Also, the probability of at least 1.0 inch of rain per week is about 20 percent. In addition, as the season progresses, temperatures drop and the rate of drying decreases.

There is not sufficient research data available to report experimental data on days available for harvesting. Based on weather data we have estimated the days available 80 percent of the years (4 out of 5) for moderately well drained soils or poorly drained soils with recommended drainage improvements.

Estimates are that harvesting can be done about 70 percent of the days in October and nearly 50 percent of the days in November 4 years out of 5. If equipment is operated every day weather permits (Table 8) you have 22 days in October and 14 days in November for harvesting 4 years out of 5. If work is done only 6 days per week, the days available drops to 18 in October and 12 in November.

Any particular year will vary from the estimated days available, but over the long term there should be more days than estimated 80 percent of the years, and less days than estimated 20 percent of the years. Unless you have about 10 years of records of your harvesting experience the values listed are probably the best guide for days available to use in determining the size or equipment capacity needed. For example, if you want to complete your harvesting between October 1 and 31, working 7 days a week, you have 22 days available 80 percent of the years.

Table 8. Estimated days available for harvesting 80 percent of the years (4 out of 5) on moderately well drained soils or poorly drained soils with recommended drainage improvements.

Period	Calendar Days	Days Available 80 percent of the years (4 out of 5) 7 day week	6 day week
Sept. 16-30	15	5	4
Oct. 1-15	15	11	9
Oct. 16-31	16	11	9
Nov. 1-15	15	8	7
Nov. 16-30	15	6	5
Total for the period	76	41	34

Corn Harvesting

Corn can be harvested as ear corn or as field shelled corn. Ear corn may be picked when grain moisture reaches 30% and the corn may be stored in well ventilated cribs without artificial drying. Harvesting of field shelled corn may begin at 26% moisture and artificial drying is required. In either case, a row type header is used and the harvesting capacity is usually determined by the number of rows on the header, ground speed and field efficiency. Field efficiency, is the ratio of actual time the machine is harvesting corn divided by the total time the machine is in the field. Normal field efficiencies for harvesting corn range from 60% to 80% and 70% is most common.

Typical machine capacities for corn pickers and corn combines operating at 70% field efficiency can be determined from Table 9. Select the ground speed you travel and the row width used to get the acres per hour per row. Then multiply this by the number of rows on your header and you have the machine capacity in acres per hour.

Table 9. Normal corn harvesting rate based upon row width, ground speed and a 70% field efficiency.

Row Width Inches	Ground Speed M.P.H. 1.5	2.0	2.5	3.0
20	0.21	0.28	0.35	0.42
30	0.32	0.42	0.53	0.63
36	0.38	0.51	0.63	0.76
40	0.42	0.56	0.70	0.84

Example: A 4 row 30" corn head traveling 2.5 m.p.h. can harvest 0.53 acres/row so the 4 row machine can harvest 2.12 acres per hour.

The next step in determining machine capacity for the corn harvest season is to determine the number of hours per day that the machine can be operated. Dairy farmers, with chores to do, may be able to operate the corn harvester only 5 hours per day while other farmers may be able to harvest 8 hours per day, and some farmers may be in a position to operate 12 or more hours per day. You should determine the hours per day available based upon the other activities competing for your time and your grain drying and handling capacity. The final step in determining the machine capacity for the harvest season is to determine the number of days available based upon the weather conditions expected during that calendar period.

There are penalties from harvesting corn at too high a grain moisture just as there are penalties from harvesting corn too late in the season.

Corn that is field shelled at grain moistures over 26 percent will have excessive splits and cracks, lower test weight and the machine losses due to fines and lost kernel tips will increase as much as 1 to 3 percent of yield. Also, the higher the grain moisture, the more drying time, fuel and air will be required. Thus, the challenge is to select varieties of corn that when planted on schedule, will be dried down to 26% moisture or less by the scheduled harvest date.

Field losses due to stalk lodging is the major penalty for late harvest. Ear loss in bushels per acre usually averages 1/3 of the percentage of stalk lodging. For example: With 10 percent of the stalks lodging, you could expect an ear loss of 3 bushels per acre. Research studies in Ohio indicate that stalk lodging increases about 5% per week after October 15.

Penalties for late harvesting include yield loss and extra machine wear.

The normal harvest period for corn in Ohio is October 15 to November 15. So, if we refer to Table 8 we find that during the period of October 16-31, we can expect 9 days in the field 80% of the time without working on Sundays. During the period November 1 to 15, we can expect only 7 days in the field. This gives a total of 16 days for the corn harvest operation. So, based upon the hours per day available for corn harvesting, the 4 row 30 inch corn harvester may handle the following acreages four years out of five.

Table 10. Acres harvested per season by one machine using different day lengths.

Acres/Hr.	Hours/Day	Acres/Day	Days Available Season	Acres Harvested Per Season
2.1	5	10.5	16	168
2.1	8	16.8	16	269
2.1	12	25.2	16	403

Now, let's assume that you could only work 8 hours per day in which to complete your corn harvest of 400 acres in the recommended period. Some changes will have to be made. There are various alternatives to consider such as:

1. Work Sundays to gain additional days.
2. Hire a man to operate your machine the needed extra hours.
3. Plant some corn varieties so as to begin the harvest October 1 and thus gain an additional 9 days for harvesting.
4. Extend the harvest period to November 30 gaining 6 additional days to harvest (this increases field losses).
5. Hire a custom operator to harvest part of your acreage.
6. Purchase a 6 row corn harvester to gain additional capacity.
7. Check dryer size and purchase a larger dryer if needed for alternatives 2, 5 or 6.

Soybean Harvesting

The competition for harvest time between soybeans and corn is increasing. In order to get higher yields from soybeans, farmers are planting longer season varieties that mature and require harvesting in competition with the corn crop.

Normally, the soybean harvest period should be ahead of corn during the period of September 16 to October 15. Referring again to Table 6, we find that we will have 13 days available for harvesting during that period.

The harvesting capacity of the grain combine in soybeans is influenced by the width of the header

Corn and soybean harvest periods overlap and compete for the few good working days.

and the type of knife. A ground speed of 2.5 m.p.h. is typical when using a flexible floating cutterbar. The hours of use per day is greatly influenced by the accessories on the combine for fast and easy changes in the cylinder speed. Older combines with chain and sprocket cylinder drive may harvest beans only 4 or 5 hours per day, whereas a combine with a variable speed cylinder drive may operate 12 to 15 hours per day.

Table 11. Typical grain combine capacities at 70% field efficiency and 2.5 m.p.h.

Width	Acres/Hr.
10′	2.1
13′	2.7
15′	3.2
20′	4.2

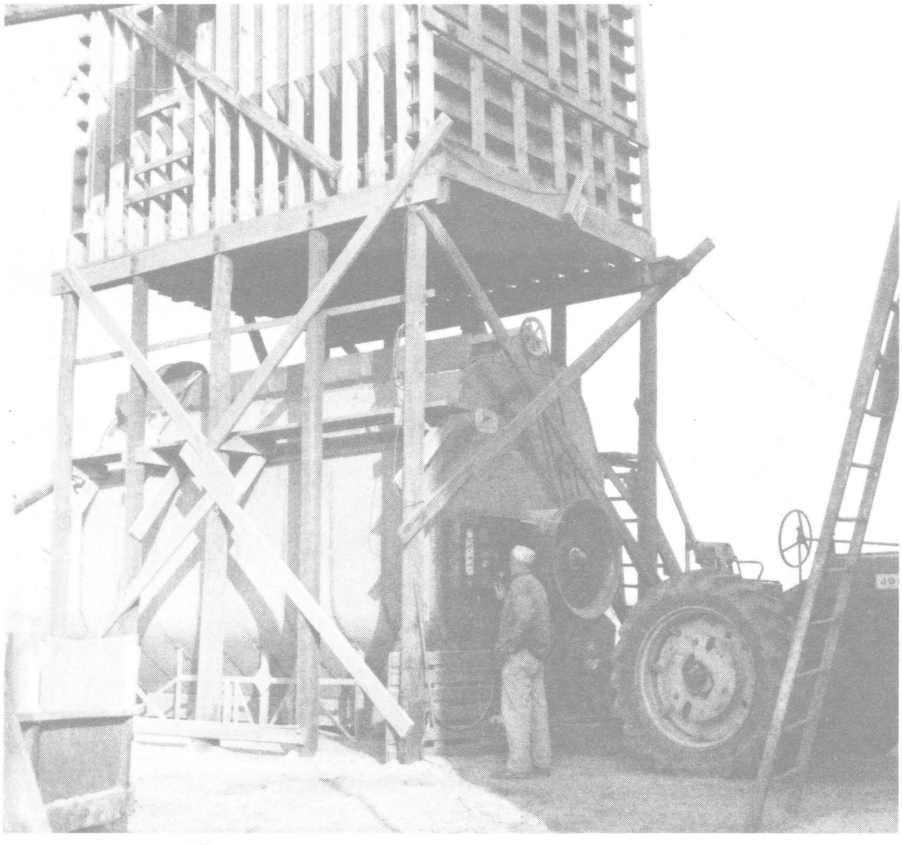
The 13 ft. grain head would be typical to match the combine with the 4 row 30" corn head. The capacity of this combine for soybeans would be 2.7 acres per hour or 22 acres per 8 hour day. Assuming that the farmer used in the previous example also had 200 acres of soybeans and works 8 hours per day—he will complete his soybean harvest in 9 days. This leaves a remainder of 4 suitable days "weatherwise" that could be used for harvesting his corn crop, provided he had it ready to harvest by that date. This would require, however, the proper variety selection and planting date to achieve this goal.

In looking at the total harvest program we now note that the 200 acres of soybeans can be harvested in 9 of the 13 days available. The total time now available for corn is 4 days from the October 1 to 15 period and 16 days from the October 16 to November 15 period, or a total of 20 days. At 8 hours per day the total corn harvesting capacity is 336 acres—or 64 acres short of the desired capacity. To gain the necessary time or capacity to harvest all his crops in the desired period, refer back to the options listed under corn harvesting.

Drying

Corn that is field shelled must be stored as high moisture corn, sold at a market penalty or "dried". Drying costs and fuel requirements may be reduced by selecting varieties that will dry down in the field to the desired harvest moisture (26% or less) by the beginning of the harvest period.

Field shelled corn may be stored as a fermented high-moisture product, may be treated with an organic acid for storage, or may be marketed directly from the field. The first two options limit the use of the grain to livestock feed and the third option results in substantial marketing penalties of shrink and drying costs plus delays in handling at the elevator. For general penalty free marketing, corn must be dried to 15.5% moisture. Timeliness of field operations combined with proper hybrid selection and adequate fertility, weed control and insect control, has a very great influence on both the capacity and energy cost of a corn drying system.



Quick access to drying and/or storage facilities is essential for timely harvest.

If timely field operation can help produce a crop of 24% average kernel moisture at harvest, rather than the common 30% moisture, an immediate benefit of 40-50% increase in capacity of a common automated batch or continuous flow dryer is realized. For a 125-bushel per acre crop, the decrease in drying energy is approximately the equivalent of 1,225,000 BTU (or 15.5 gallons of commercial propane) per acre. The resultant cost reduction is approximately 5.5 cents per bushel or $7.00 per acre with propane at 45c per gallon. The lower harvest moistures may also make more attractive the use of low-temperature drying methods which are commonly more efficient in terms of BTU's of purchased energy per bushel dried. Combinations of high-temperature and low-temperature systems may be used to gain rapid drying, energy savings, and improved grain quality.

Drying equipment is generally selected to match the harvesting rate and moisture removal required. This equipment may be on or off the farm. When on farm drying and storage is not available, quick access to commercial drying and storage must be guaranteed. Time lost waiting to unload grain delays field work.

If energy for drying is short or not available, the alternatives are to harvest ear corn and allow natural drying or store high moisture corn.

Alternatives and Trade-Offs

Many factors limit corn and soybean production. We have discussed several important ones. The manager's job is to remove or reduce the most limiting factors. Frequently there are several alternatives to choose from and there is a trade-off between factors. In order to be well prepared, it is a good idea to think through the years schedule of seed selection, tillage, planting, weed and insect control, fertilizer application, cultivating, harvesting, handling, storage and marketing. You'll probably need a pencil and paper to take into account the time available, examine alternative varieties, machine sizes and risk levels. If you have a complex operation, a computer analysis may be useful to help test the likely results of changes being considered.

TIMELY FIELD OPERATIONS WORK SHEET

	4 row 30" planter	(your machines)
1. **Hours per day** available for working in the field.	10	
2. **Acres per hour** machine capacity. Machine width in feet × speed in miles per hour × field efficiency ÷ 8.25.	3.1	
3. **Acres per day** machine capacity (1. × 2.).	31	
4. **Days available for field work** during the dates when the work should be done. See Table 3, Table 8, or your experience and yearly records.	8	
5. **Acres possible to cover** during the season or period when it should be done (3. × 4.).	248	
6. **Acres needing the operation.** Based upon farm size and cropping plans.	250	
7. **Acres machine capacity in excess of need** (5. — 6.). Consider more land or smaller machine.	O.K.	
8. **Acres machine capacity is short of need** (6. — 5.). Consider less land, variety selection and scheduling, working more hours per day, more labor, larger machine, custom hire, improved field efficiency, improved drainage.	O.K.	